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April 26, 2012

Mr. Thomas Alcamo
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Chicago, IL 60604

**Subject: Final ABB Long Term Groundwater Monitoring Plan
AOC #V-W-08-C-890**

Dear Tom,

Per your letter of February 29, 2012, accepting the parties' response to comments for this plan, the plan has been modified to incorporate these changes and is being submitted to you as Final.

Please confirm to CBS and ABB that this final plan has been accepted by EPA.

Very truly yours,

Dottie Alke

Dorothy M. Alke
Vice President, Environmental Projects

Enclosure

cc: Jessica Fliss, IDEM (w/enclosure)
John Bassett, AECOM (w/enclosure)
Jeff Lifka, Tetra Tech (w/enclosure)
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FINAL

LONG TERM GROUNDWATER

MONITORING PLAN

FOR THE

ABB BLOOMINGTON PLANT SITE

Administrative Settlement Agreement and Order on Consent for Removal Action, Docket No. V-W-08-C-890

Addendum 2 to the Bloomington ABB QAPP

APRIL 2012

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1.0 Introduction

1.1 Purpose of the Document

This document is Addendum 2 of the Project Specific QAPP for the Removal Actions at the Bloomington ABB Plant Site, January 2008. It is based on the Report of Results for the Groundwater and Surface Water Investigation Work Plan required in Section VIII, Paragraph 16i of the U.S. Environmental Protection Agency (U.S. EPA) Administrative Settlement Agreement and Order on Consent for Removal Action at the ABB Plant Site, Bloomington, Indiana (AOC). (Reference 1) Based upon the results of that groundwater and surface water investigation, a long term groundwater monitoring plan was to be developed according to Section VIII, Paragraph 16j of the AOC to monitor any impact to groundwater and surface water affected by the former capacitor plant. This document fulfills that requirement.

1.2 Groundwater Investigation Plan (GWIP) and Report of Results

CBS submitted a Groundwater and Surface Water Investigation Plan (GWIP) to the U.S. EPA in March 2008 (Reference 2). The U.S. EPA conditionally approved the GWIP on May 7, 2008, with the proviso that CBS submit a dye trace work plan to the agency by May 30, 2008. CBS submitted a Scope of Work for Dye Tracing on May 25, 2008.

CBS completed the investigation tasks as described in the GWIP and issued the Report of Results for the Groundwater and Surface Water Investigation in October 2010. The purpose of the GWIP was two-fold:

1. To determine if area springs received site related contaminants.
2. To determine if any residential wells still in use between the site and the area springs received site related contaminants.

To accomplish that purpose the following tasks were completed:

1. All springs within one mile of the site were identified.
2. Area springs were sampled for site related contaminants during non-storm conditions for at least four quarters (six quarterly samples were eventually taken).
3. Any spring that showed site related contaminants during quarterly sampling was sampled during a storm event of at least one inch magnitude.
4. Sediments were sampled downstream of any area spring that showed site related contaminants during quarterly sampling.
5. A dye trace was conducted from the site to determine if any area springs received dye from that trace.

6. All residences and businesses between the site and any area spring receiving site related contaminants were inventoried for water supply wells in use and any wells found to be in use were sampled for site related contaminants.

The results of these investigations showed:

1. Only Detmer Spring received site related contaminants during the quarterly sampling.

2. Detmer Spring was sampled during a storm event of one inch magnitude or greater and contaminant discharge did not spike at significant amounts.

3. Sediments were taken at five downstream locations from Detmer Spring and the highest result was 2.4 mg/kg PCBs.

4. The dye injected at the site only resurged at Detmer Spring and no other area spring received dye from the trace.

5. No residential wells were found in use between the site and Detmer Spring.

The CBS Report of Results for the Groundwater and Surface Water Investigation, dated October 2010, should be referenced for complete details of the investigation activities.

1.3 Site Remediation and Report

A substantial amount of remedial effort has occurred at the site over the years. These efforts have included soil removals around the perimeter and grounds of the site, building decontamination and demolition and removal of the concrete building slab and underlying contaminated soils. The activities conducted under the AOC (Reference 3) included concrete slab removal, subslab soil remediation and removal of all out structures and final closure (grading and seeding) of the site. A detailed report on these activities can be found in Reference 4, "The Final Report for the Completion of Removal Action for the ABB Plant Site (former Westinghouse Electric Corporation Facility), located at 300 North Curry Pike, Bloomington, Monroe County, Indiana". This Final Report was prepared by CBS Corporation (formerly known as Westinghouse Electric Corporation) and ABB Power and T&D Company, Inc. (hereafter referred to as the Parties). It describes the joint effort undertaken by the Parties pursuant to an Administrative Order on Consent with the U.S. EPA, Region 5, "The Administrative Settlement Agreement and Order on Consent for Removal Action, Docket No. V-W- 08-C-890".

The purpose of the Final Report was to document the actual procedures, activities and controls associated with the project and to present the sampling and monitoring data accumulated during the remediation actions. Additional records associated with this project, including air monitoring data, weekly progress reports, shipping logs, manifests, certificates of disposal, chain of custody documents, laboratory certificates of analysis, etc., are available upon request for review and future reference at the CBS Corporation offices in Pittsburgh, Pennsylvania. The Final Report for the Completion of Removal Action for the ABB Plant Site should be referenced for details of the remediation.

2.0 Site History

2.1 Site Description

The ABB plant site is located approximately 2.5 miles west of the center of the City of Bloomington, Indiana. The facility is located on a 148-acre site comprising open fields, woods, and some marsh-like areas to the north of the plant. The plant itself occupied a footprint of approximately 10 acres. The site is located within a mixed residential, commercial, and industrial area along Curry Pike in northwest Bloomington. Two trailer parks are located immediately north of the property. Industrial facilities are present to the west. Bordering the site to the east is a developed commercial area along State Route 37. Figure 1 shows the location of the site.

2.2 Previous Site Investigations and Initial Remediation

For a full discussion of previous site investigations Reference 1 and Reference 2 should be consulted. For initial remedial measures Reference 4 and Reference 5 should be consulted. A brief summary is given below:

- In 1958, Westinghouse Electric Corporation constructed the plant and began operations.
- Westinghouse discontinued its use of PCBs in 1977.
- In 1979 a replacement sanitary sewer system was built above the old system and in 1989 the roof drains were modified to reroute the drains from the north of the plant to the south of the plant.
- In February 1989, Westinghouse entered into a joint venture with Asea Brown Boveri (ABB) to jointly operate the Bloomington plant. Westinghouse and ABB jointly operated the plant through December 1989, when ABB exercised its option to purchase the facility and business. After January 1, 1990, ABB became the sole owner of the facility.
- From 1977 through 1988 several sampling actions were undertaken near the plant. Analytical results of the samples showed elevated levels of PCBs in soils at the plant and in onsite water samples.
- On May 3, 1989, the U.S. EPA, Region 5, issued a Unilateral Administrative Order to Westinghouse Electric Corporation pursuant to Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and

Reauthorization Act of 1986 (SARA). The order required the removal of PCB impacted soil and material. These removal activities were completed in 1993.

- Substantial PCB sampling and cleanup activities were again performed in the early 1990s in conjunction with ABB's renovation of the inside of the facility, including cleaning and sealing of the concrete floors.

- Manufacturing operations ceased at the plant in 1998. ABB demolished the plant buildings in 2006. The concrete floor slab of the plant was left in place to act as a cap over the contaminated soils underneath until final remediation could occur.

2.3 Summary of Remediation Activities

A complete discussion of remediation activities is given in Reference 4. An AOC was issued on January 3, 2008. This order required removal of the concrete slab and underlying contaminated soil. Subsequent testing of concrete and soils was carried out and a work plan was approved by the U.S. EPA in June 2009 (Reference 5). From July to December 2009 a remediation of the remaining concrete and soils was carried out. The remediation included:

- The Demolition, removal, transportation, and disposal of Toxic Substances Control Act (TSCA) and Special Waste concrete.

- Excavation of TSCA, Special Waste, and Resource Conservation and Recovery Act (RCRA) soils and verification sampling associated therewith.

- Onsite stockpile sampling of RCRA characteristic soils.

- Onsite treatment of RCRA characteristic soils for reuse as onsite backfill.

- Transportation and offsite disposal of TSCA and Special Waste soils.

- Construction of an approximately 23,000-cubic-yard borrow pit on site to provide backfill material for completed soil excavations and final site restoration.

- Onsite reuse of sized low level PCB concrete (<35 ppm maximum) as structural fill in the borrow pit.

- Collection, testing, storage, and treatment of water during remediation.

- Diversion of storm water around active excavations.

- Collection, testing, storage, and treatment of storm water and ground water encountered in active excavations.

- Air monitoring during removal, stockpiling, and handling of TSCA concrete and TSCA soil.

- Site restoration and project closeout.

Following removal of all contaminated concrete and soil in the main plant area and the completion of successful verification sampling, the site was backfilled with 23,000 cubic yards of clean clay from the onsite borrow pit. The site was graded so that all surface water would ultimately drain to the sedimentation pond at the southeast corner of the site (see Drawing 1). The final grading and seeding of the site was completed in 2010.

ABB left a concrete consolidation area paved over with asphalt in the northwest corner of the site (Drawing 1). Approximately 20,000 cubic yards of concrete was consolidated there with an average PCB content of 5.6 ppm. Slow seepage into and out of the consolidated concrete stockpile is expected. Seepage out of the stockpile is expected to resurge at Detmer Spring.

3.0 Site Characteristics

3.1 Topography and Physiography

The Bloomington ABB plant site is located on the Mitchell Plain physiographic province of Indiana (Figure 2). The Mitchell Plain is an unglaciated, gently rolling, lowland plateau that is developed on Mississippian age carbonates (Reference 6). The area is shown in Hartke and Gray (Reference 7) as an area of karst topography, but there is not much expression of sinkholes in the immediate area of the plant site. The 1908 topographic map (Figure 3) shows numerous sinks to the east and west of the site, but no expression of sinks within the site, or within the footprint of where the building was.

3.2 Geology

Based on the United States Department of Agriculture Soil Conservation Service soil survey for Monroe County (Reference 8), the soils disturbed by construction of facilities and roads are classified as Udorthents. They are nearly level to moderately sloping, deep, and well drained to somewhat poorly drained soils that have been modified by cut and fill, and other methods of construction. Most of the soils in the immediate vicinity of the site are so classified. The remainders of the undisturbed soils at the site are deep silt loams that are moderately well drained. They are 10 to15 feet thick and are underlain by a stiff brick red clay soil known as "terra rosa". Detailed discussion of the soils and the geology can be seen in Reference1 and Reference 2.

Bedrock units interpreted to be at the site based on the site's proximity to the Lemon Lane site are the St. Louis Limestone of the Blue River Group and the Salem Limestone of the Sanders Group, in descending order. Both units are of Mississippian age (Reference 9).

The St. Louis is composed of gray to yellow-brown limestone, dolostone, and shale. The limestones are generally fine to medium crystalline with scattered brachiopod, coral, and crinoid fossil fragments. Thin layered glauconitic limestones were noted in Lemon Lane cores but were not abundant.

The upper part of the Salem is lithologically identical to the St. Louis. The building stone unit of the Salem is a characteristic light grayish yellow to gray, oolitic, highly fossiliferous, finely crystalline, massive bedded limestone.

The strata of the Mitchell Plain generally slope or dip southwest from their surface exposure on the flank of the Cincinnati Arch into the Illinois Basin. The dip averages about 30 feet per mile to the southwest in the Bloomington area (Reference 10). The relatively thin brittle units of the St. Louis Limestone in the vicinity of the site are commonly fractured at a close interval into relatively small joint bounded blocks of limestone. The joints are mostly near vertical, but inclined joints are common to some beds. The vertical joints predominantly occur in two sets. The master set is oriented east-west in a narrow range; a cross-joint set is oriented north-south in a wider range. Master joints are those that transect more than one bed of rock, as well as those joints parallel to them. Cross-joints normally occur in a set peculiar to a single bed.

3.3 Hydrology

3.3.1 Karst Features

The site is located on a topographic high area where several drainage basins originate. The upper reaches of these basins where they converge at the site are intermittent to ephemeral, and the perennial flow of these drainage basins begins at springs as shown on Figure 1. The surface drainage basins are:

- Stout's Creek West (to the north and northwest) fed by Detmer Spring
- Stout's Creek East (to the northeast) fed by Snoddy Springs
- Sinking Creek (to the south)

As the site is currently configured by drainage ditches, all surface runoff enters the Sinking Creek drainage channel through the sedimentation basin at the southeast corner of the site. The outfall of the sedimentation basin was the NPDES sampling point which ABB monitored for contaminants. CBS did not therefore monitor this location.

Although the areas to the west and east of the site show numerous sinkholes, the site ridge area itself does not show sinkhole development. Analysis of the 1908 topographic map and 1939 aerial photo confirms there were no visible sinkholes where the plant was built. There is a possible sink 600 feet north of the plant and another sink 800 feet northeast of the plant. The unusually thick soils (20 to 25 feet) on the site ridge may have inhibited sinkhole development.

3.3.2 Site Groundwater and Sampling Results

Groundwater at the site was initially investigated for CBS in a Phase 1 and Phase 2 Hydrogeologic Investigation Report conducted by Cummings-Riter Consultants, Inc. (CRC) (Reference 11 and Reference 12). An extensive network of top-of-bedrock piezometers was installed by CRC. Detail concerning those piezometers can be found in the Phase 1 and Phase 2 reports. The Phase 1 report was issued in June 1993 and the Phase 2 report was issued in December 1993. A summary of the sampling results for site related contaminants is also given in the GWIP. The extensive network of top-of-rock and near-top-of-rock piezometers did not show widespread contamination of groundwater in this zone, despite areas of high soil contamination removed during the remediation. Nor did the network of piezometers indicate where site groundwater might be traveling to and resurging. It was recognized that the random location of monitoring wells was an inappropriate method for determining the ultimate fate and transport of contaminants to offsite receptors in karst terrains. Nearby springs and streams that have the potential to receive site contaminants of concern are known to be more reliable monitoring points, particularly if confirmed by dye tracing (Reference 13).

Groundwater producing zones at the site that were previously investigated in the1993-2000 time frame were the base of the soil horizon and the first few feet into rock, and a dolostone-shale zone about 55 to 60 feet below ground level ranging in elevation between 822.2 feet to 826.7 feet amsl. There was a 200 foot deep well at the site that was reported on the driller's log as producing 12 gallons per minute (gpm). However, by 1988 there was no record of this well nor was the location known to any plant personnel.

Groundwater in the dolostone-shale zone 55 to 60 feet below ground surface was investigated east of the main plant site in relation to a temporary storage facility that was constructed there. Details of those wells are given in the Phase 1 and Phase 2 Hydrogeologic Investigation Reports that were conducted by CRC. A summary of the sampling results for site related contaminants for those wells is also given in the GWIP. These wells did not show significant levels of VOCs or PCBs.

Although there is evidence of upper bedrock conduit development at the site, the kind of pervasive and rapid conveyance of highly contaminated soils and/or free product into the subsurface evident, for example, at the nearby Lemon Lane Landfill site (Reference 10), does not appear to be occurring here. This lack of rapid vadose movement of contaminants into lower parts of the aquifer, and hence to the springs, is explained by the relatively thick (average 25 feet) clay soils and the lack of sinkhole development at the site.

As noted above and described in the GWIP and the Report of Results of the GWIP, the focus of groundwater monitoring then became the area springs that had the potential of receiving site drainage carrying the contaminants of concern. The steps taken in the GWIP are described above in Section 1.2. Below is the amended spring list for the sampling undertaken for the GWIP:

- Detmer Spring
- Worker Spring
- Mobley Springs 1&2
- Loesch Road Spring
- Stony West A Spring
- Stony West B Spring
- Cave Creek Headwaters
- Snoddy A Spring
- Snoddy B Spring

Sinking Creek headwaters (Figure 4) was not included in the contaminant sampling schedule because it was the NPDES sampling point for ABB Corporation and was sampled under these requirements. It was, however, included as a sampling point for the site dye trace. Robertson Spring was not included in the contaminant sampling schedule because it was found to be a resurgence of Stout's Creek water and not a separate spring. Details of that determination may be found in the Report of Results for the GWIP. A dye trace conducted from an injection well on site beginning on March 30, 2009, found that the dye resurged at Detmer Spring and no other area spring. Details of that dye trace may be found in the Report of Results for the GWIP.

Only Detmer Spring had detectable levels of site related contaminants after sampling was conducted on the springs for six quarters. The results can be found in Table 1 of Reference 1. A storm event was sampled at Detmer Spring on April 7-8, 2010 and these results can be found in Table 2 from the Report of Results for the GWIP. No high level PCBs or other site related contaminants were found during the storm event monitoring.

Figure 5 from Reference 1 shows the sediment sample locations downstream from Detmer Spring and Table 3 from Reference 1 shows the results of that sampling. There were no unacceptable levels of PCBs found in the sediments.

3.3.3 Residential Well Inventory

The full details of the residential well inventory can be seen in the Reference 1. Figure 6 from that report shows the area between the site and Detmer Spring that was inventoried. No residential or commercial wells were found to be in use and the entire area is served by city water utilities.

4.0 Groundwater Monitoring Conclusions

All area springs with the potential to receive drainage from the site were sampled over six quarters. Only Detmer Spring was found to have site related contaminants. A dye trace was conducted from an injection well on site and dye was conclusively detected only at Detmer Spring and not at any other area spring. It is conclusively demonstrated that site groundwater flows north and resurges at Detmer Spring. The area between the site and Detmer Spring where groundwater flows was inventoried for any residential well in use that might come in contact with groundwater flow from the site containing site related contaminants. No residential or commercial wells were found in use in this area. Therefore, future long term monitoring efforts should focus solely on Detmer Spring.

5.0 Long Term Groundwater Monitoring Plan - Quality Objectives and Criteria for Measurement Data

5.1 Data Quality Objectives (DQOs) Process

This section shows how the Data Quality Objective (DQO) process was applied for this plan. The DQO process focuses studies by clarifying vague objectives and limiting the number of decisions that must be made (U.S. EPA 2000). The process enables data users and technical experts to specify data requirements prior to collection events. It provides a convenient way to document activities and decisions, to communicate the data collection design to others, and to give the data user confidence that the data collected support the decisions concerning remediation and redevelopment of the site. Finally, the DQO process is designed to save resources by streamlining the study process and making data collection operations more resource-effective.

5.1.1 Problem Statement

Manufacturing operations began at the site in 1958 and the plant closed in 1998. Several of the chemicals used at the site and/or their degradation products have been detected in onsite monitoring wells, onsite soil test borings, and Detmer Spring. These are known as the site-related contaminants and include:

- Polychlorinated Biphenyls (PCBs, primarily Aroclors 1016, 1242 and 1248)
- Trichloroethylene (TCE)
- Perchloroethylene (PCE) also known as tetrachloroethene
- 1,2,4- Trichlorobenzene
- 1,2,3- Trichlorobenzene
- 1,4- Dichlorobenzene
- 1,3- Dichlorobenzene
- 1,2- Dichlorobenzene
- 1,1- Dichloroethane
- Vinyl Chloride
- 1,1- Dichloroethylene
- Cis- 1,2- Dichloroethylene
- Trans- 1,2 Dichloroethylene
- Dichloromethane (methylene chloride)
- 1,1,1- Trichloroethane
- 1,2,4- Trimethylbenzene
- 1,3,5- Trimethylbenzene

The plant site has been demolished. The former manufacturing building has been removed and the remaining concrete slab and underlying contaminated soils were removed in 2009. Final grading and site restoration was finished in 2010. An Environmental Restrictive Covenant (ERC) is being filed for the site which will prohibit groundwater usage.

A long-term groundwater monitoring plan is required to allow an assessment of the impact of the removal of the concrete floor and underlying soils on the quality of the local groundwater and surface water.

The site is located in karst terrane. In karst terrane, the majority of the groundwater at the site will travel in well defined tertiary porosity features such as solution conduits. These conduits occupy a very small portion of the subsurface and typically cannot be found efficiently by drilling randomly located wells. The quality of the groundwater moving in these conduits can vary significantly from that of groundwater associated with primary and secondary porosity features such as the bulk rock matrix and small fractures. Monitoring wells which do not intercept these conduits will be of little value in evaluating the quality of the vast majority of the site groundwater or the transport of contaminants offsite.

Therefore, in karst terrane, the most efficient and reliable method to monitor the overall quality of groundwater at the site as well as to determine the risk to offsite potential receptors of groundwater is to sample springs which are the natural outflows of these conduits. The focus is on those springs which are known to receive site groundwater.

The previous investigations established the proper spring monitoring locations to serve as a baseline of the existing groundwater quality, to determine if the removal activity itself perturbed the groundwater and now serve as an initial data set for review to allow the development of a long-term groundwater monitoring plan which will document changes in groundwater quality over time after completion of the remedy.

The known or suspected contaminants in groundwater include PCBs and other VOCs (site-related contaminants). The remaining source areas, the concrete slab and sub soils, have been removed. The exposure pathways to site groundwater include wells drilled on site, wells drilled off site in the direction of karst water travel and local springs/streams which receive site groundwater.

There are no extraction wells currently at the site and city water is available on the site and in the area around the site. Thus, it is unlikely that any well will be developed on or near the site in the future. Therefore, the realistic potential exposure scenarios are at offsite springs/streams. Since the stream water is not used as drinking water, receptors of concern are the biota in the stream.

5.1.2 Identify Goals

Based on this and previous investigations at and around the site, the following can be concluded about site groundwater and groundwater use in the site area.

1. The aquifer at the site is below the top of limestone bedrock and can be characterized as a karst aquifer. Most groundwater in the karst aquifer is expected to flow in discreet conduits and finding these conduits is very difficult.

2. Most wells drilled and sampled on the site in past investigations did not show contamination above detection limits. There are a few exceptions and this is typical of wells drilled randomly in karst aquifers.

3. Detmer and Robertson Springs showed some low levels of site contaminants in a relatively high percentage of previous samples. This indicates these springs likely receive at least some portion of site groundwater.

4. During six quarters of sampling, Detmer Spring consistently showed site-related contaminants and has been determined to be the spring to which site groundwater flows.

5. Robertson Spring has been shown to be the recurrence of shallow bed flow of Stout's Creek West Branch and not a true groundwater spring.

6. Dye tracing from an injection well on-site showed a conclusive trace to Detmer Spring and no other area springs received that tracer.

7. Other springs in the area of the site showed no occurrence of site related contaminants. This indicates that they received little or no site related groundwater.

8. Residential well surveys have been completed in the past within 5,000 feet of the site as part of investigation efforts for the Lemon Lane Landfill. Most of the identified wells were sampled and no contaminants were found. City water is now widely available in the area and it has been shown that all of the previously identified wells are no longer in use. It is highly unlikely that any significant number of new wells would be drilled in the future.

The principal question to be answered is: What effect will the final site remediation and restoration have on the long term quality of groundwater at the site and the discharge quality at Detmer Spring?

5.1.3 Identify Information Inputs

Sampling data will be required to answer the question posed in Section 5.1.2. The sampling data needs include water samples of Detmer Spring. The samples will be analyzed for site related contaminants, PCBs and VOCs.

The action levels for spring water samples will be set by aquatic water quality standards in Indiana for protection of aquatic species and/or human contact to stream water. Appropriate sampling and analysis techniques are available to support these information needs from existing approved U.S. EPA methods in either SW 846 or the CWA for VOCs.

For PCBs, water quality standards are below the practical quantitation limits of currently approved methods. Therefore, the lowest approved practical quantitation limit (approximately 0.3 ppb) is the default standard for PCB discharge to surface water.

5.1.4 Define Boundaries of Study

The study boundary is the groundwater that resurges at Detmer Spring.

Detmer Spring will be sampled quarterly for two years during non-storm conditions (no rain greater than a cumulative total of .25 inches for seventy-two hours prior to sampling) to cover all seasons. Storm sampling during the investigation phase determined no high levels of site related contaminants were discharged, consequently no further storm sampling is necessary. After two years, trend analysis will be performed and a decision made as to the frequency of subsequent sampling.

5.1.5 Develop Analytic Approach

The question to be answered with this groundwater monitoring plan for PCBs and VOCs in springs is: What level is the spring impacted above laboratory reportable limits at the present time during non-storm flows?

To answer the above question for PCBs, quarterly non-storm samples will be analyzed for PCBs in water using SW-846 method 8082 for Aroclor PCBs. The routine detection limit for PCBs at Heritage is 0.1 to 0.2 ppb.

For VOCs in spring water, SW-846 method 8260 will be used. Heritage will perform the VOC analysis at a detection limit of 0.1 ppb. The VOCs to be reported are the same as used for the Groundwater Investigation Plan (GWIP) (Reference 2 at Table 13) which is set forth in Attachment 2.

5.1.6 Specify Performance or Acceptance Criteria

The decision to be made at this point includes:

- Do the concentrations of site-related contaminants show increasing, decreasing, or no-trend after 8 quarters of sampling, and depending on the trend, what will the subsequent frequency and duration of sampling be? This decision will be made after reviewing 8 quarters of non-storm sample results. Therefore the performance criterion is acceptable samples taken at the springs for 8 quarters and accepted lab analytical data for each sample. The trend analysis will be the Mann-Kendall Non-Parametric test for trend.

5.1.7 Develop Plan for Obtaining Data

PCBs and VOCs will be sampled using grab samples per Field Procedure, FP-4, Rev. 1, Surface and Water and Sediment Sampling, for non-storm water samples. FP-4 is part of the Bloomington ABB QAPP. The samples will be taken during non-storm conditions which will be defined as no rain on the day of sampling , no more than 0.25 cumulative inches of rain in the past seventy-two hours prior to sampling, and no surface water runoff above the spring is occurring. Each PCB grab sample will be a 1 liter sample analyzed using SW-846 8082 with a reporting limit of .1 or .2 ppb. Each VOC sample will be taken in 40 ml VOC vials and analyzed for VOCs using SW-846 8260b. The reporting limits will be 5 ppb for all VOCs except vinyl chloride, which will be 2 ppb. All samples will be analyzed at Heritage Environmental Services, Inc. laboratories in Indianapolis. The list of analytes is given in Table 13 of the GWIP and is attached.

6.0 Groundwater Monitoring Plan

6.1 Spring Sampling

The spring to be sampled is Detmer Spring. The spring location is shown on Figure 4. Samples will be taken quarterly for two years during non-storm conditions (no rain greater than a cumulative total of .25 inches for seventy-two hours prior to sampling). Samples will be analyzed for:

- PCBs
- TSS
- VOCs (per site-related contaminants in attached Table 13 of the GWIP)

Field parameters of flow, conductivity, and temperature will also be measured. Flow measurements will be by velocity probe and cross-sectional area unless flow is too low; then it will be visually estimated.

6.1.2 Sample Evaluation and Long-term Monitoring

Based on the trend analysis of the eight quarters of sampling using the Mann-Kendall Non Parametric test for trend, a decision will be made about the frequency and duration of any remaining monitoring.

6.1.3 Data Analysis and Reporting

Once the monitoring plan is implemented, monitoring reports will be provided to the U.S. EPA quarterly. The monitoring reports will include Excel spreadsheets which will include recent historical data updated with the latest monitoring data for the reporting period. Flow and water quality data will be provided. Whenever possible, data will be submitted in an electronic format.

6.1.4 Sample Collection

Water samples will be taken per the procedures included in Field Procedure, FP-4, Rev. 1, Surface Water and Sediment Sampling. FP-4 is part of the Bloomington ABB QAPP. All sampling equipment should be cleaned and decontaminated prior to each use. Any of the alternate sampling methods included in FP-4 may be used.

Tables 3-10 and 3-11 of the Bloomington ABB QAPP list the sample containers, preservatives, hold times and reporting limits that are to be conformed to for the various analytes in soil and water samples, respectively. The tables also list the extraction methods and analytical procedures that are to be used at the lab for each analyte.

6.1.5 Water Sample Collection

When collecting water samples, samples for volatile organics analysis will be collected first, followed by nonvolatile organics and inorganics. All split and duplicate samples for volatile organics analysis should be taken as near simultaneously as possible, followed by all nonvolatile organics and inorganics.

Water samples for volatile organics analysis should be collected to ensure that no bubbles are trapped in the sample container.

For springs, unfiltered grab samples will be taken by hand dipping sample containers directly into the main exit point of the spring orifice or center of the stream, as applicable.

For VOC samples 4-40ml glass vials will be used per water sample point and preserved with HCL at 4°C. The samples will be extracted and analyzed according to U.S. EPA procedures SW846 Methods 3510 / 8260B.

For PCB samples a 1 liter pre-cleaned sample bottle will be used. PCB samples will be sent for total PCB and TSS analysis. PCB samples will be extracted according to U.S. EPA Method SW846-3510. The PCB analysis will be to a reporting limit of 0.1 ppb by an approved lab for this project whose procedures will be in accordance with the requirements of "Test Methods for Evaluation of Solid Waste: Physical/Chemical Method" (U.S. EPA SW-846, latest edition) analytical method 8082. TSS samples will also be sent to an approved lab and analyzed in accordance with procedures that meet the requirements of U.S. EPA 160.1 from U.S. EPA 600/4-79-030 latest edition.

During each sample cycle, a duplicate sample will be taken and a field blank will also be taken. The duplicate will be a second sample of water taken from one of the sample points. The field blank will be an identical sample bottle filled with DI water at the site while taking the samples. Field parameters of conductivity and temperature will also be measured.

6.1.6 Sample Identification System

A sequential sample numbering system will be used to identify each sample, including duplicates and blanks. Each sample will be assigned a unique sample number. The field activity leader will maintain a listing of sample identification numbers in the field logbook. Each sample number will consist of six digits as illustrated by the following example: **AB 0001.**

The "**AB**" is the sample site code and refers to the Bloomington ABB site. The four digits are the sequential number. The sample number will be added to the respective field notebook, sample label, and chain of custody form.

6.1.7 Initiation of Field Custody Procedures

Region V chain of custody protocols, as described in the National Enforcement Investigations Center (NEIC) Policies and Procedures, U.S. EPA-330/9-DDI-R, Rev. June 1985, will be followed for all samples. Custody procedures are described in Section 3.3.6 of the QAPP.

6.1.8 Field Activity Documentation and Logbook

A field logbook, as discussed in Field Procedure, FP-1, of the Bloomington ABB QAPP, will be initiated at the start of the Field Sampling Program and maintained to record on site activities. The field logbook is a controlled document that becomes part of the permanent site file. The field logbook will consist of a bound notebook with consecutively numbered pages that cannot be removed. The logbook cover will indicate the following:

- Project Name
- Project Geologist's and Field Activities Leader's Name
- Sequential Book Number
- Project Start Date
- Project End Date

It is important that this document be maintained to provide a record of field activities. Daily entries will be made during periods of site activity. Entries will include the following:

- Summaries of daily site activities
- Arrival and departure of site visitors
- Arrival and departure of equipment
- Start and completion of sampling activities

- Sample pickup including chain of custody form number, carrier, date, and time
- Equipment calibration and repair
- Decontamination procedures used
- Health and safety issues
- Levels of personal protection

At the beginning of each entry, the date, start time, weather conditions, and names of the site personnel and visitors present will be recorded. Each page will be initialed. Entries will be recorded in ink, and no erasures are permitted. Incorrect entries will be stricken with a single line, initialed and dated.

6.1.9 Sample Shipment and Transfer of Custody

Sample handling and shipping procedures and transfer of custody procedures are provided in Section 3.3 and Field Procedure, FP-12, of the Bloomington ABB QAPP.

6.1.10 Bottle Requirements

The contaminant-free sample containers (bottles) used for this sampling effort will be prepared according to the procedures specified in U.S. EPA Specifications and Guidance for Obtaining Contaminant-Free Sample Containers, December, 1992. Bottles used for the sampling activity will not contain target organic and inorganic contaminants exceeding the level specified in the above mentioned document. Specifications for the bottles will be verified by checking the supplier's certified statement and analytical results for each bottle lot, and will be documented on a continuing basis. This data will be maintained in the project evidence file and will be available, if requested, for review by the government parties.

In addition, the data for field blanks, etc., will be monitored for contamination per Section 3.5.1.1 of the Bloomington ABB QAPP. Corrective actions will be taken as soon as a problem is identified and include discontinuing the use of a specific bottle lot, contacting the bottle supplier(s) for retesting the representative bottle from a suspect lot, resampling the suspected samples, and validating the data, taking into account that the contaminants could be introduced by the laboratory (i.e., common lab solvents, sample handling artifacts, etc.). If a bottle QC problem occurs, a determination of whether the bottles and data are still usable will be made.

Amber glass bottles with Teflon liners will be used for PCB water samples.

6.1.11 Sample Preservation and Holding Time

Tables 3-10 and 3-11 of the Bloomington ABB QAPP list the sample containers, preservatives and hold times that are to be conformed to for the various analytes in soil and water samples, respectively. Samples will all initially be stored on ice to 4°C for preservation.

6.1.12 Sample Handling, Packaging, and Shipment

Sample Handling and Transporting instructions are listed in Section 8.2.6 of Field Procedure, FP-3, Groundwater Sampling, for water samples. Sample packing and transportation requirements are described in Field Procedure, FP-12, Packaging and Shipping of Field Samples.

6.1.13 Decontamination Procedures

This section provides the general guidelines for the decontamination of sampling and monitoring equipment and sample bottles. Field Procedure, FP-2, Rev. 1, Decontamination of Sampling Equipment, of the Bloomington ABB QAPP, discusses decontamination procedures.

The following equipment will be on site:

- distilled water
- isopropanol and water solution 10 percent by volume
- non-phosphate detergent
- scrub brushes; squirt bottles for alcohol and water; plastic bags and plastic sheets
- drums or carboys for disposal of waste

6.1.14 Sampling Equipment Decontamination

All sampling equipment and monitoring equipment (e.g. temperature and conductance probes) will be decontaminated between sampling locations by the following procedures from Field Procedure, FP-2, Rev 1, Decontamination of Sampling Equipment:

- Wash contaminated equipment contact surfaces with non-phosphate detergent.
- Rinse with tap water.
- Spray rinse with 10 percent alcohol solution.
- Rinse with distilled water and air dry.

6.1.15 Sample Bottle Decontamination

Sample bottles or containers filled in the field will be decontaminated before being packed for shipment or handled by personnel without dermal hand protection as follows:

- Wipe container with a paper towel dampened with potable water.
- Dispose of used paper towels as specified in the Section 9.

6.1.16 Preventive Maintenance Procedure and Schedule

Field team members will refer to the field procedures in the Bloomington ABB QAPP or the manufacturers' instrument manuals for the appropriate preventive maintenance procedures for the field equipment used at the site. Section 3.6.1 of the QAPP discusses Preventive Maintenance Procedures.

6.1.17 Investigation-Derived Waste

The waste material generated during a field investigation is known as Investigation Derived Waste (IDW). At these groundwater sampling locations, there is a very low potential to generate IDW that has any significant level of contamination on it. IDW will be handled as discussed in Section 3.2.1.14 of the Bloomington ABB QAPP.

6.1.18 Types of Investigation-Derived Waste

Materials that may become IDW requiring proper treatment, storage and disposal are:

- Personnel protective equipment (PPE). This includes disposable coveralls, gloves, booties, respirator canisters, etc. It is expected that normal work clothes will be used by samplers with disposable gloves and booties where appropriate.

- Disposable equipment (DE). This includes plastic ground and equipment covers, aluminum foil, Teflon® tubing, broken or unused sample containers, sample container boxes, tape, etc.

- Groundwater obtained through well development or well purging.

- Cleaning fluids such as spent solvent and wash water.

6.1.19 Management of Investigation-Derived Waste

In general there will be a small quantity of IDW generated during the sampling related to this plan. Disposable booties and gloves and any spent hazardous cleaning liquids will be disposed of in accordance with U.S. EPA regulations. Waste generated will be properly contained and labeled at the site. The waste will be manifested and shipped to a permitted treatment or disposal facility in accordance with U.S. EPA regulations. In the case of purge water, it will be taken to the Neal's Landfill Spring Treatment Facility for treatment and disposal.

REFERENCES

1. CBS Corporation, "Report of Results for the GROUNDWATER AND SURFACE WATER INVESTIGATION PLAN FOR THE ABB BLOOMINGTON PLANT SITE, Addendum 1 to the Bloomington ABB QAPP", October 2010.

2. CBS Corporation, "GROUNDWATER AND SURFACE WATER INVESTIGATION PLAN FOR THE ABB BLOOMINGTON PLANT SITE, Addendum 1 to the Bloomington ABB QAPP", March 2008.

3. Administrative Order on Consent with the U.S. EPA, Region 5, "The Administrative Settlement Agreement and Order on Consent for Removal Action, Docket No. V-W- 08-C-890" (AOC). January 3, 2008.

4. CBS Corporation, "FINAL REPORT, COMPLETION OF REMOVAL ACTION FOR BLOOMINGTON ABB, Bloomington, Indiana, Monroe County", February 2010.

5. PSARA Technologies, "Remediation Work Plan, Soil Remediation and Removal of the Concrete Slab Floor, Former ABB Manufacturing Plant, Bloomington, Indiana", dated June 2009, and approved by the U.S. EPA on July 8, 2009 (Work Plan).

6. Malott, C.A., 1922, "The Physiography of Indiana", in *Handbook of Indiana Geology*, Indiana Department of Conservation, Pub. 21, Pt.2, p 59-256.

7. Hartke, E. J., and H.H. Gray, 1989, "Geology for Environmental Planning in Monroe County", Indiana Department of Natural Resources, Geological Survey Special Report 47

8. United States Department of Agriculture, 1981, Soil Conservation Service, Monroe County Soil Survey

9. Shaver, R.H., et.al. 1986, "Compendium of Paleozoic Rock-Unit Stratigraphy in Indiana- A Revision", State of Indiana, Department of Natural Resources, Geologic Survey.

10. Powell, Richard L., Geosciences Research Associates, Inc., 1982, "Geology and Hydrology of Lemon Lane Landfill, Monroe County, Indiana", for U.S. EPA

11. Cummings/Riter Consultants, Inc., June 1993, "Phase 1 Hydrogeologic Investigation Report, ABB Plant Site, Bloomington, Indiana."

12. Cummings/Riter Consultants, Inc., December 1993, "Phase 2 Hydrogeologic Investigation Report, ABB Plant Site, Bloomington, Indiana."

13. U.S. EPA, “Groundwater Monitoring in Karst Terranes: Recommended Protocols and Implicit Assumptions”, EPA 600/X-89/050, February 1989.

Attachment 2

Table 13 of ABB GWIP - ABB Bloomington Plant Analytes, Groundwater Protection Standards, Maximum Concentrations on Site, and Lab Reporting Limits				
Chemical	**IDEM RISC Migration to GW STD (ppm) Ind**	**IDEM RISC Migration to GW STD (ppm) Res**	**Max Contamination found on site (ppm) to date**	**Lab Reporting Limits (ppb)**
1,2,4 Trichlorobenzene	77	5.3	**2300**	5
1,2,3 Trichlorobenzene	NL	NL	800	5
1,4 Dichlorobenzene	3.4	2.2	**29**	5
1,3 Dichlorobenzene	8.9	2.3	**14**	5
1,2 Dichlorobenzene	270	17	**20**	5
1,1 Dichloroethane	58	5.6	**11**	5
Vinyl Chloride	0.027	0.013	**1.6**	2
1,1 Dichloroethylene	42	0.058	**79 (oil)**	5
cis 1,2 Dichloroethylene	5.8	0.4	**300**	5
trans 1,2 Dichloroethylene	14	0.68	**8**	5
Dichloromethane (methylene chloride)	1.8	0.023	**2.4**	5
1,1,1 Trichloroethane	280	1.9	**93 (oil)**	5
1,2,4 Trimethylbenzene	780	2.5	**7.2**	5
1,3,5 Trimethylbenzene	190	0.61	**1.7**	5
tetrachloroethene	0.64	0.058	**280**	5
trichloroethene	0.082	0.057	**1200**	5
PCBs	18	6.2	**>1000**	0.1

Notes

1. NL = not listed. There is no IDEM standard for 1,2,3 Trichlorobenzene.
However, it will be analyzed for at the springs since it is in site soils at appreciable levels.
2. Bolded Text in the concentration column indicates that the maximum value found in site soils exceeds the IDEM migration to groundwater residential standard